

**WE CLAIM:**

1. A method of valuing a portfolio relative to other portfolios, the method comprising:
  - 5 (a) calculating the overperformance of a portfolio relative to said benchmark under each of a plurality of scenarios to obtain a first plurality of values;
  - (b) calculating the underperformance of said portfolio relative to a benchmark under each of said plurality of scenarios to obtain a second plurality of values;
  - 10 (c) calculating a third value, said third value being a function of said first plurality of values;
  - (d) calculating a fourth value, said fourth value being a function of said second plurality of values; and
  - 15 (e) calculating a fifth value, said fifth value being a measure indicating the desirability of said portfolio, said fifth value being one of:  
a function of said third value; a function of said fourth value;  
a function of said third and fourth values.
- 20 2. The method as claimed in claim 1, wherein said third value is one of: the maximum value of said first plurality of values; the mean of said first plurality of values; the median of said first plurality of values.
- 25 3. The method as claimed in claim 1, wherein said fourth value is one of: the maximum value of said first plurality of values; the mean of said first plurality of values; the median of said first plurality of values.
4. The method as claimed in claim 1, wherein each scenario of said plurality of scenarios is associated with a probability of future

- 39 -

occurrence.

5. The method as claimed in claim 4, wherein said third value is one of: the maximum values of said first plurality of values; the expected value of said first plurality of values; the value associated with the scenario having the highest probability of future occurrence; the value associated with the scenario having the lowest probability of future occurrence.
6. The method as claimed in claim 4, wherein said fourth value is one of: the maximum values of said first plurality of values; the expected value of said first plurality of values; the value associated with the scenario having the highest probability of future occurrence; the value associated with the scenario having the lowest probability of future occurrence.
7. The method as claimed in claim 1, wherein said fifth value is one of: the third value; the fourth value; the third value divided by the fourth value; the third value subtracted by the fourth value; the third value subtracted by the product of a constant and the fourth value, said constant indicative of a level of risk aversion.
8. A method of ranking portfolios, wherein:
- (a) each of a plurality of portfolios are valued according to the method of claim 1, 2, 3, 4, 5, 6, or 7;
  - (b) the plurality of portfolios are ordered according to the measure indicating the desirability of each portfolio; and
  - (c) a portfolio is selected from the plurality of portfolios ordered in (b).
9. The method as claimed in claim 8, wherein the portfolio selected in (c) has the highest measure of desirability.

- 40 -

10. A method of determining the composition of an optimal portfolio, the method comprising:
- (a) providing a plurality of constraints which define a plurality of portfolios;
  - 5 (b) providing a utility function;
  - (c) determining the composition of a portfolio of said plurality of portfolios wherein said portfolio satisfies said plurality of constraints and said utility function, wherein a first value quantifying the overperformance of said portfolio relative to
  - 10 a benchmark under a plurality of scenarios is maximized in relation to other portfolios in said plurality of portfolios, and wherein a second value quantifying the underperformance of said portfolio relative to said benchmark under said plurality of scenarios does not exceed a specified third value.
- 15 11. The method as claimed in claim 10, wherein said utility function is maximized, said utility function being dependent on at least one of said first and second values.
12. The method as claimed in claim 11, wherein each scenario in said plurality of scenarios is associated with a probability of future
- 20 occurrence.
13. The method as claimed in claim 12, wherein said first value is the expected overperformance of said portfolio under said plurality of scenarios, and wherein said second value is the expected underperformance of said portfolio under said plurality of
- 25 scenarios.
14. A method of determining the composition of an optimal portfolio, the method comprising:

004277.00587260

- 41 -

- 5 (a) providing a plurality of constraints which define a plurality of portfolios;
- (b) providing a utility function;
- 10 (c) determining the composition of a portfolio of said plurality of portfolios wherein said portfolio satisfies said plurality of constraints and said utility function, wherein a first value quantifying the underperformance of said portfolio relative to a benchmark under a plurality of scenarios is minimized in relation to other portfolios in said plurality of portfolios, and wherein a second value quantifying the overperformance of said portfolio relative to said benchmark under said plurality of scenarios exceeds a specified third value.
- 15 15. The method as claimed in claim 14, wherein said utility function is maximized, said utility function being dependent on at least one of said first and second values.
16. The method as claimed in claim 15, wherein each scenario in said plurality of scenarios is associated with a probability of future occurrence.
- 20 17. The method as claimed in claim 16, wherein said first value is the expected underperformance of said portfolio under said plurality of scenarios, and wherein said second value is the expected overperformance of said portfolio under said plurality of scenarios.
- 25 18. A method of determining the composition of an optimal portfolio, the method comprising:
- (a) providing a first set of constraints which define a plurality of portfolios;
- (b) determining the composition of a plurality of efficient

004277-00587260

- 42 -

- 5 portfolios, wherein each of said efficient portfolios satisfies said plurality of constraints, wherein for each of said efficient portfolios a first value quantifying the overperformance of the efficient portfolio relative to a benchmark under a plurality of scenarios is maximized in relation to other portfolios in said plurality of portfolios and a second value quantifying the underperformance of said efficient portfolio relative to said benchmark under a plurality of scenarios does not exceed a specified third value; and
- 10 (c) selecting an optimal portfolio from said plurality of efficient portfolios that satisfies a utility function.
- 15 19. The method as claimed in claim 18, wherein said utility function which is maximized, said utility function being dependent on at least one of said first value of each of said efficient portfolios and said second value of each of said efficient portfolios.
- 20 20. The method as claimed in claim 19, wherein each scenario in said plurality of scenarios is associated with a probability of future occurrence.
21. The method as claimed in claim 20, wherein said first value of an efficient portfolio is the expected overperformance of that efficient portfolio under said plurality of scenarios, and wherein said second value of an efficient portfolio is the expected underperformance of that efficient portfolio under said plurality of scenarios.
- 25 22. The method as claimed in claim 18, wherein parametric programming is used to perform step (b).
23. A method of determining the composition of an optimal portfolio, the method comprising:

DO NOT POST 460



- 44 -

28. A method of pricing portfolio insurance, the method comprising:
- (a) determining an investor's utility;
  - (b) obtaining a price based on said investor's utility for a security whose payoffs match the losses of the portfolio relative to a benchmark under a plurality of scenarios, wherein each of said plurality of scenarios is associated with a probability of future occurrence; and
  - (c) valuing insurance for the portfolio based on said price.
29. The method of pricing portfolio insurance in claim 28, wherein said investor's utility is represented by a function which is to be maximized, said function being dependent on at least one of: a value relating to the overperformance of the portfolio relative to said benchmark under said plurality of scenarios; a value relating to the underperformance of the portfolio relative to said benchmark under said plurality of scenarios.
30. A system for valuing portfolios, said system comprising a risk engine adapted to perform the method as claimed in one or more of claims 1 - 27.
31. A system for pricing portfolio insurance, said system comprising a risk engine adapted to perform the method as claimed in claim 28 or claim 29.